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A Case Study of Efficacy of Freshwater Immersion in Controlling Introduction of Alien Marine Fouling Communities: The USS *Missouri*, pp. 223-231

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Abstract:

The historically significant battleship USS *Missouri* was recently decommissioned and moved from Bremerton, Washington, to Hawai'i to become a memorial museum at Pearl Harbor, O'ahu, Hawai'i. Dry-docking was completed in January 1993, and since that time the vessel has been part of the inactive fleet. In this 5-yr period, a dense growth of fouling organisms had developed on the outer surfaces of the hull. Out of concern that the fouled hull could become a source for the introduction of alien aquatic nuisance species to Hawaiian waters, an evaluation of the fouling community was conducted. In this study we found 116 taxa among 12 phyla in 10 samples scraped from the vessel's hull. Seventy-six species were identified: 11 known from Hawaiian waters, 17 with known temperate-boreal distributions, and the remaining 48 known only from the Pacific Northwest. Forty percent of the taxa in this fouling community were not identified to species, so there remained some potential for alien species introduction. As a precaution to prevent accidental introductions, the ship was moved from Bremerton to the Columbia River in Oregon for a 9-day sojourn in freshwater before its transoceanic crossing to Pearl Harbor. Inspection of the vessel's hull upon arrival in Pearl Harbor revealed more than 90% of the hull to be completely clear of any fouling organisms. Only 11 species were found to be alive: 3 species probably recruited to the hull on the transoceanic crossing that may routinely arrive in Hawaiian waters, 4 species already present in Hawai'i, 3 Pacific Northwest species that appeared to be close to death on their arrival in Hawai'i, and 2 euryhaline amphipod species probably recruited to the hull while in the Columbia River. The amphipods were not reproductive and brooding young, suggesting that these species would not be successful colonists. A final inspection and sampling of the hull 83 days after arriving at Pearl Harbor failed to find live or dead Columbia River amphipods nor were the three Pacific Northwest species alive. Freshwater exposure for 9 days coupled with increased water temperatures during the journey to Hawai'i appear to be an extremely effective means of eliminating the temperate marine fouling

community. This action substantially reduced the probability that an alien species would be introduced with the arrival of this historic vessel in Hawai'i.